

**15359**  
**Impact melt**  
**4.2 grams**



Figure 1: Photo of 15359. Cube is 1 cm. S71-49797.

### **Introduction**

Lunar sample 15359 is a rake sample from the rim of Spur Crater (see section on 15311). It is a fine-grained micropoikilitic impact melt with mineral clasts, and has a KREEP –like chemical composition. It has been dated at ~3.86 b.y. and should be compared with impact melt rocks 15356 and 15357.

### **Petrography**

Simonds et al. (1975) termed 15359 a “very fine subophitic impact melt with mineral clasts”. Ryder and Spudis (1987) reported that 15359 “has a fine-grained ophitic texture, with pigeonite oikocrysts about 100 microns across. The enclosed plagioclase grains are stubby and euhedral, with a fairly even grains size of 30 – 50 microns. Interoikocryst grains are not much larger than chadocysts. Ilmenites tend to be anhedral, dispersed, and very small. Interstitial glass appears to be rare, although silica and apatite grains are present. In one area the ground mass grades into a different texture with strongly bladed ilmenite and plagioclase grains. Most clasts, which are less than 1 mm across, are monomineralic, angular to subrounded plagioclase grains, but olivine and pyroxene are present. Many mineral clasts have overgrowth rims.”

Dowty et al. (1973) and Nehru et al. (1974) reported a zircon and determined mineral compositions (figure 4).

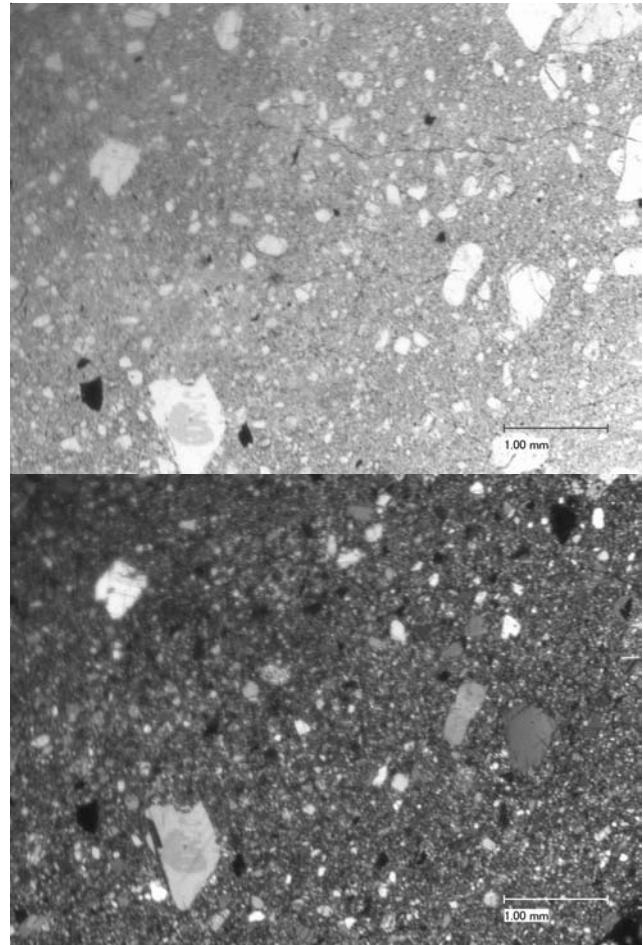


Figure 2: Photomicrographs of thin section 15359,6 @ 50x by C meyer.

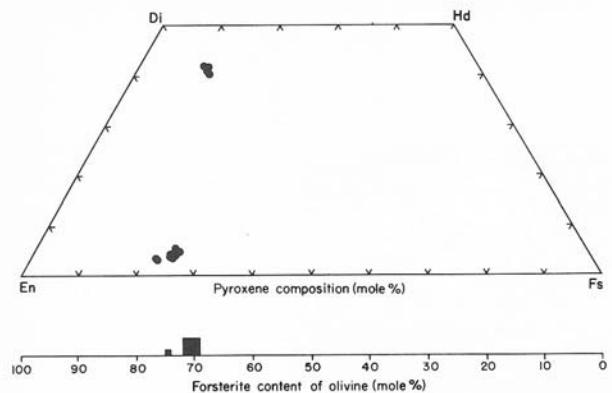


Figure 3: Composition of olivine and pyroxene for 15359 (Dowty et al. 1973).

**Table 1. Chemical composition of 15359**

reference	Ryder87	Murali77	Dowty73
weight			
SiO <sub>2</sub> %	47.1	(b)	48.6 (c)
TiO <sub>2</sub>	1.08	(b) 0.5	(a) 1.08 (c)
Al <sub>2</sub> O <sub>3</sub>	17.9	(b) 19.8	(a) 18 (c)
FeO	8.6	(b) 8.3	(a) 9.6 (c)
MnO	0.15	(b) 0.1	(a) 0.1 (c)
MgO	12.7	(b) 12.2	(a) 11 (c)
CaO	11.1	(b) 11.7	(a) 10.3 (c)
Na <sub>2</sub> O	0.5	(b) 0.59	(a) 0.66 (c)
K <sub>2</sub> O	0.5	(b) 0.19	(a) 0.19 (c)
P <sub>2</sub> O <sub>5</sub>	0.55	(b)	0.05 (c)
S %			
sum			
Sc ppm	16.1	(a) 15.2	(a)
V		43	(a)
Cr	1000	(a) 1260	(a) 2200 (c)
Co	26.5	(a) 20	(a)
Ni	231	(a) 137	(a)
Cu			
Zn			
Ga			
Ge ppb			
As			
Se			
Rb	4.7	(a)	
Sr		(a)	
Y		(a)	
Zr	385	(a) 781	(a) 1050 (c)
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm	0.2	(a)	
Ba	314	(a) 270	(a)
La	35.3	(a) 40	(a)
Ce	95	(a) 111	(a)
Pr			
Nd	60	(a)	
Sm	16.8	(a) 17.7	(a)
Eu	1.65	(a) 1.57	(a)
Gd			
Tb	3.6	(a) 3.5	(a)
Dy		22	(a)
Ho			
Er			
Tm			
Yb	10.2	(a) 11.6	(a)
Lu	1.53	(a) 1.6	(a)
Hf	11.1	(a) 15	(a)
Ta	1.6	(a) 1.8	(a)
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm	7.2	(a)	
U ppm	2.6	(a)	

technique: (a) INAA, (b) fused-bead e-probe, (c) broad-beam e-probe

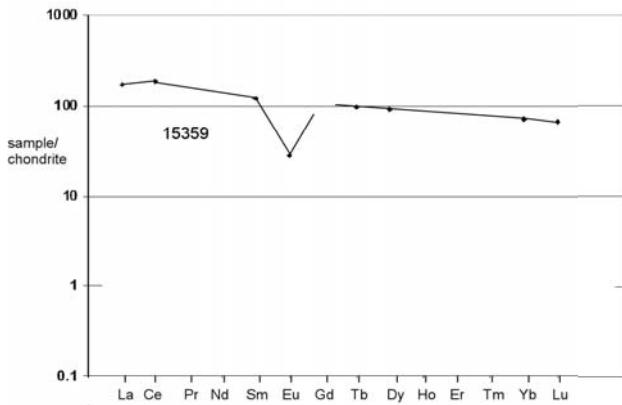


Figure 4: Normalized REE diagram for 15359.

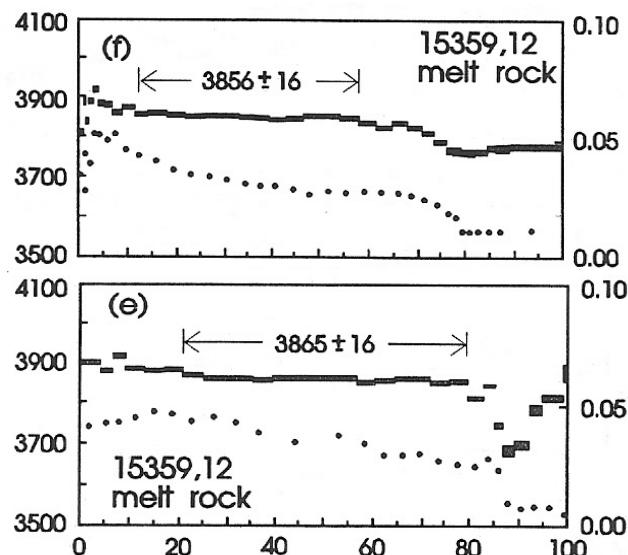


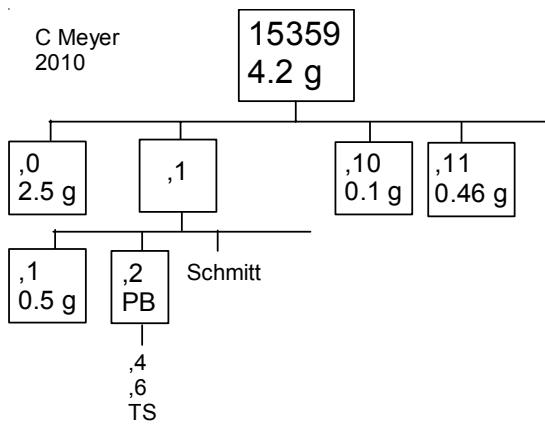
Figure 5: Age vrs % Ar released for 15359  
(Dalrymple and Ryder 1993).

## Chemistry

Murali et al. (1977) and Ryder and Spudis (1987) determined the chemical composition (table 1, figure 4).

## Radiogenic age dating

Dalrymple and Ryder (1993) obtained an age of 3.86 b.y. by Ar/Ar dating of 15359 (figure 5).



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